

Appl. No. : 09/945065
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AMENDMENTS TO THE CLAIMS

1. (Currently Amended) An integrated circuit comprising:
 - a silicon substrate;
 - an insulating layer formed on the silicon substrate wherein the insulating layer has an opening that extends from an upper surface of the insulating layer to an upper surface of the substrate so as to expose the upper surface of the substrate;
 - a metal layer formed in the opening wherein a first portion of the metal layer is formed on the exposed upper surface of the substrate and reacts with silicon in the substrate to form metal silicide, wherein a second portion of the metal layer is formed on the sidewalls of the opening does not contact the substrate and remains unreacted; and
 - a metal silicide adhesion layer formed on an upper surface of the first and second portions of the metal layer, wherein the adhesion layer comprises substantially the same composition as the metal silicide formed in the substrate, wherein the metal silicide adhesion layer adheres the second portion of the metal layer to a metal nitride layer contact fill that is subsequently formed on the first and second portions of the metal layer in the contact opening and fills substantially the entire opening, wherein a portion of the adhesion layer directly contacts and combines with the metal silicide in the substrate to form a refractory metal silicide layer that is less than about 150 Angstroms thick and directly contacts the metal nitride fill.
2. (Original) The integrated circuit of Claim 1, wherein the metal layer comprises titanium.
3. (Original) The integrated circuit of Claim 2, wherein the metal nitride layer comprises titanium nitride.
4. (Original) The integrated circuit of Claim 3, wherein the metal silicide adhesion layer comprises titanium silicide.
5. (Previously Canceled)
6. (Original) The integrated circuit of Claim 4, wherein the metal silicide adhesion layer is approximately 50-150 Å thick.
7. (Canceled)
8. (Currently Amended) The integrated circuit of Claim 1, wherein the contact opening has an aspect ratio of at least 10:1.

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9. (Original) The integrated circuit of Claim 8, wherein the exposed upper surface of the substrate comprises a junction region.

10. (Canceled)

11. (Canceled)

12. (Currently Amended) The integrated circuit of Claim 113, wherein the titanium nitride contact fill comprises TiCl₄ based titanium nitride.

13. (Canceled)

14. (Currently Amended) A high aspect ratio contact structure formed over a junction region in a silicon substrate, comprising:

an insulating layer wherein the insulating layer defines a contact opening wherein the contact opening is formed over the junction region of the substrate and exposes a portion of the substrate;

a titanium layer formed in and adjacent the contact opening, wherein a first portion of the titanium layer is formed on the insulating layer and a second portion of the titanium layer is formed on the exposed portion of the substrate, wherein at least a portion of the second portion of the titanium layer contacts the exposed substrate and reacts with the silicon in the substrate to form titanium nitride, wherein the first portion of the titanium layer does not contact the substrate;

a titanium silicide adhesion layer formed on an upper surface of the first and second portion of the titanium layer, wherein the titanium silicide adhesion layer is between about 50-150 Angstroms thick and combines with the titanium silicide in the substrate to form a refractory metal silicide layer; and

a titanium nitride contact fill formed in and adjacent the opening, wherein the titanium nitride is formed on an upper surface of the titanium silicide adhesion layer, wherein the titanium nitride contact fill is adhered to the first portion of the titanium layer by the titanium adhesion layer.

15. (Original) The contact structure of Claim 14, wherein the contact opening has an aspect ratio of at least 10:1.

16. (Original) The contact structure of Claim 14, wherein the titanium nitride contact fill comprises TiCl₄ based titanium nitride.

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17. (Original) The contact structure of Claim 14, wherein the insulating layer comprises BPSG.

18. (Canceled)

19. (Original) The contact structure of Claim 14, wherein the titanium silicide adhesion layer comprises a titanium rich layer interspersed with titanium silicide.

20. (Original) The contact structure of Claim 14, wherein the titanium silicide adhesion layer comprises less chlorine than the titanium layer.

Claims 21 – 35 (Previously Canceled)